

5.2: Sample Means

- * Counts and proportions describe
- * However, we approximate them with
- * Statistics often use _____ to describe data

Examples:

- * The most common are

Population

Sample

mean

proportion

std. dev.

sample mean =

* from...

* from...

Distr. of X (population)

center:

spread:

shape:

Distr. of \bar{x} (sample)

center:

spread:

shape:

pop: normal

pop: not normal

sample: normal

sample:

Central Limit Theorem:

How large of a sample is needed?

- * depends...

- * The more non-normal the population...

- * General Rule

CHECK:

RECAP:

- * For one individual observation:
- * For a sample of observations (of size n)...

Example: Cola bottles

What sample gives the lower probability??

This means that...

Thus...

**** Now complete worksheets 5.2A and 5.2B**

$$\textcircled{1} \quad N(2.17, 0.11)$$

$$a) \quad P(X < 2) = \text{normcdf}(-E99, 2, 2.17, 0.11) \\ = 0.0611$$

b) check: normal pop ✓
or
 $n \geq 30$

$$P(\bar{X} < 2) = \text{normcdf}(-E99, 2, 2.17, \frac{0.11}{\sqrt{10}}) \\ = 5.122 \times 10^{-7}$$

$$\textcircled{2} \quad N(65,000, 1,900)$$

$$a) \quad P(X > 68,500) =$$

$$= \text{normcdf}(68500, \text{E}99, 6500, 1900)$$

$$= \textcircled{0.0327}$$

b) normal pop. \checkmark

$$P(\bar{X} > 68,500) = \text{normcdf}(68500, \text{E}99, 6500, \frac{1900}{\sqrt{4}})$$

$$= \textcircled{1.147 \times 10^{-4}}$$

$$\textcircled{3} \quad \mu = 1000$$
$$\sigma = 20.5$$

$$a) P(X < 975) = ?$$

$$n = 45$$
$$b) \text{ check: normal pop}$$

or

$$n \geq 30 \quad \checkmark$$

$$P(\bar{X} < 975) = \text{normalcdf}(-E99, 975, 1000, \frac{20.5}{\sqrt{45}})$$

$$\textcircled{= 0}$$

WKSHT 5.2B

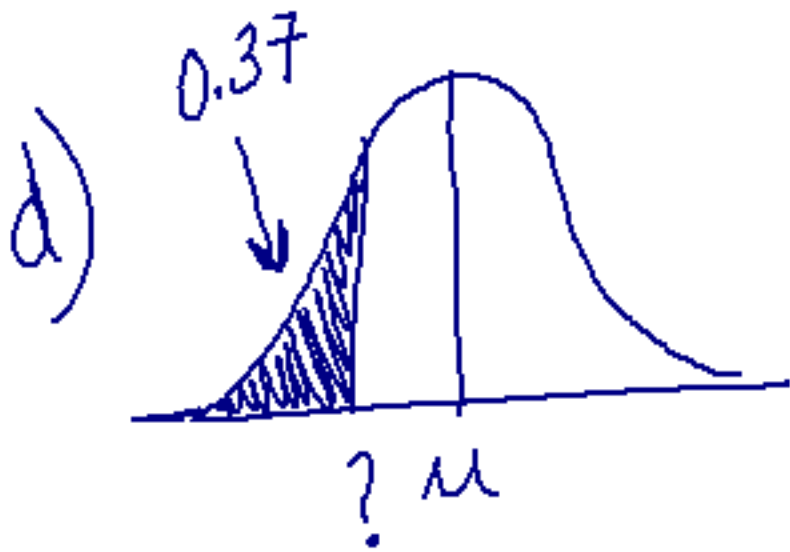
① $N(106, 12)$

a) $N(106, \frac{12}{5})$

normal
pop. ✓

b) $P(\bar{X} > 100) = \text{normcdf}(100, \infty, 106, \frac{12}{5})$
 $= 0.9938$

c) $P(102 \leq \bar{X} \leq 110) = \text{normcdf}(102, 110, 106, \frac{12}{5})$
 $= 0.9044$



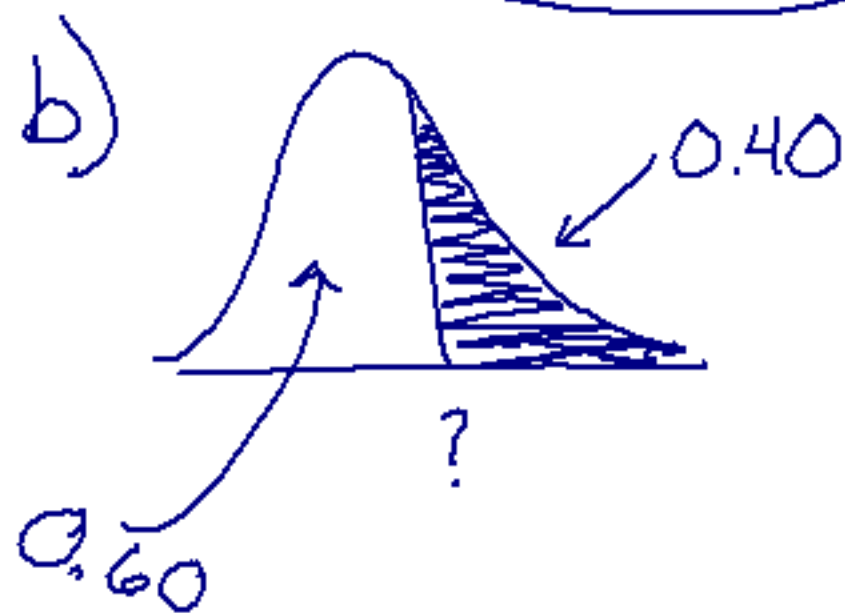
* $P(\bar{X} < ?) = 0.37$

$$? = \text{invnorm}(0.37, 106, 12/5) = 105.2$$

↑
prob. below

② $\mu = 0.26$ $n = 35 \geq 30 \checkmark \Rightarrow \text{normal}$
 $\sigma = 0.12$

a) $P(0.25 \leq \bar{X} \leq 0.27) =$
 $= \text{normcdf}(0.25, 0.27, 0.26, \frac{0.12}{\sqrt{35}})$
 $= 0.3780$



* $P(\bar{X} > ?) = 0.40$

$? = \text{invnorm}(0.6, 0.26, \frac{0.12}{\sqrt{35}})$

$= 26.51 \%$